

make the transition to any of the other three modes.

- **Diagnostic** — This mode provides access to all sensory data in real time and is intended for use in diagnosis of sensor anomalies.

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Simulation of Dropping of Cargo With Parachutes

Decelerator System Simulation (DSS) is a computer program for predicting and analyzing the dynamics of a load of cargo dropped with parachutes from an aircraft. A DSS simulation runs from the first motion in the aircraft until the payload reaches the ground. Intended for use in support of airdrop tests for the X-38 program, DSS was developed by modifying and augmenting an older program, denoted UD233A, used for simulating the dynamics of a space-shuttle solid rocket booster falling with a parachute. The main effort in converting UD233A into DSS involved development of computational models for simulating the inflation of one or more parachute(s), the dynamics of the payload and the slings connecting the parachute(s) with the payload, and the extraction of the payload and parachutes from the aircraft.

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DAVE-ML Utility Programs

DAVEtools is a set of Java archives (*.jar files) that embodies tools for manipulating flight-dynamics models that have been encoded in dynamic aerospace vehicle exchange markup language (DAVE-ML). [DAVE-ML is an application program, written in Extensible Markup Language (XML), for encoding complete computational models of the dynamics of aircraft and spacecraft. The goal in the continuing development of DAVE-ML is to expedite the exchange and validation of dynamical models, via the Internet, in a manner that is consistent and is independent of computational-simulation facilities, computing languages, and simulation software.] At present, DAVEtools includes two tools:

- *dave* (a basic DAVE-ML parser), which generates a Java-based version of a model encoded in DAVE-ML and
- *dave2sl*, which builds on *dave* to create Simulink® representations of models encoded in DAVE-ML.

The manipulations that can be performed at the present early stage of development are rather limited. More importantly, DAVEtools serves as an example of how to write an import software tool for a DAVE-ML file.

*This program was written by Bruce Jackson of **Langley Research Center**. For further information, access <http://daveml.nasa.gov>. LAR-16879-1*

Robust Control for the Mercury Laser Altimeter

Mercury Laser Altimeter Science Algorithms is a software system for controlling the laser altimeter aboard the Messenger spacecraft, which is to enter into orbit about Mercury in 2011. The software will control the altimeter by dynamically modifying hardware inputs for gain, threshold, channel-disable flags, range-window start location, and range-window width, by using ranging information provided by the spacecraft and noise counts from instrument hardware. In addition, because of severe bandwidth restrictions, the software also selects returns for downlink. To reduce mission risk, the software incorporates three different modes of operation. The three modes are denoted as fixed, range-driven, and closed-loop (or adaptive). The fixed mode provides fixed hardware inputs for all but the threshold. The range-driven mode receives and utilizes ranging information from the spacecraft regarding its slant range to the planet or asteroid. The adaptive mode is capable of improving upon the ranging information provided by the spacecraft by use of a closed-loop range-estimation algorithm. The software is sufficiently robust that it could be used on other missions, and in fact, this has already been proposed.

*This program was written by Jacob S. Rosenberg of **Goddard Space Flight Center**. Further information is contained in a TSP (see page 1). GSC-14876-1*